

Amendments to the claims:

Claims 11-14 are cancelled.

Claims 46, 49 and 52 are amended.

1.- 5. (Cancelled)

1 6. (Previously Presented) A spin valve transistor comprising:
2 an emitter;
3 a collector;
4 a base between the emitter and the collector;
5 a spin valve including:
6 a ferromagnetic free layer structure;
7 a self-pinned antiparallel (AP) pinned layer structure without any pinning structure
8 pinning the self-pinned AP pinned layer structure; and
9 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
10 structure; and
11 the base comprising at least said free layer structure;
12 the self pinned AP pinned layer structure comprising:
13 a ferromagnetic first antiparallel (AP) pinned layer;
14 a ferromagnetic second antiparallel (AP) pinned layer;
15 a nonmagnetic antiparallel coupling (APC) layer located between the first and
16 second AP pinned layers;
17 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
18 a positive magnetostriction;
19 the CoFe film having a magnetostrictive anisotropy field that is oriented
20 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
21 layer structure; and
22 the first and second AP pinned layers having the same magnetic thickness.

1 7. (Previously Presented) A spin valve transistor comprising:
2 an emitter;
3 a collector;
4 a base between the emitter and the collector;
5 a spin valve including:
6 a ferromagnetic free layer structure composed of iron (Fe);
7 a self-pinned antiparallel (AP) pinned layer structure;
8 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
9 structure; and
10 the free layer structure interfacing the spacer layer;
11 the base comprising at least said free layer structure;
12 the self pinned AP pinned layer structure including:
13 a ferromagnetic first antiparallel (AP) pinned layer;
14 a ferromagnetic second antiparallel (AP) pinned layer; and
15 a nonmagnetic antiparallel coupling (APC) layer located between the first and
16 second AP pinned layers;
17 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;
18 the second AP pinned layer including:
19 an iron (Fe) film;
20 a cobalt iron (CoFe) film with a positive magnetostriction;
21 the iron (Fe) film being located between and interfacing the APC layer and the
22 cobalt iron (CoFe) film; and
23 the CoFe film having a magnetostrictive anisotropy field that is oriented
24 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
25 layer structure.

1 8. (Original) A spin valve transistor as claimed in claim 7 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 9. (Previously Presented) A spin valve transistor as claimed in claim 7 wherein the
2 cobalt iron (CoFe) film is $\text{Co}_{50}\text{Fe}_{50}$.

1 10. (Original) A spin valve transistor as claimed in claim 9 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

11.- 15. (Cancelled)

1 16. (Previously Presented) A magnetic head assembly comprising:
2 a write head;
3 a read head adjacent the write head;
4 the read head including:
5 ferromagnetic first and second shield layers; and
6 a spin valve transistor located between the first and second shield layers;
7 the spin valve transistor comprising:
8 an emitter;
9 a collector;
10 a base between the emitter and the collector;
11 a spin valve including:
12 a ferromagnetic free layer structure;
13 a self-pinned antiparallel (AP) pinned layer structure without any pinning
14 structure pinning the self-pinned AP pinned layer structure;
15 a nonmagnetic spacer layer between the free layer structure and the AP
16 pinned layer structure; and
17 the base comprising at least said free layer structure;
18 the self pinned AP pinned layer structure comprising:
19 a ferromagnetic first antiparallel (AP) pinned layer;
20 a ferromagnetic second antiparallel (AP) pinned layer;
21 a nonmagnetic antiparallel coupling (APC) layer located between the first and
22 second AP pinned layers;
23 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
24 a positive magnetostriction;
25 the CoFe film having a magnetostrictive anisotropy field that is oriented
26 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
27 layer structure; and
28 the first and second AP pinned layers having the same magnetic thickness.

17. (Previously Presented) A magnetic head assembly comprising:
a write head;
a read head adjacent the write head;
the read head including:
ferromagnetic first and second shield layers; and
a spin valve transistor located between the first and second shield layers;
the spin valve transistor comprising:
an emitter;
a collector;
a base between the emitter and the collector;
a spin valve including:
a ferromagnetic free layer structure composed of iron (Fe);
a self-pinned antiparallel (AP) pinned layer structure;
a nonmagnetic spacer layer between the free layer structure and the AP
pinned layer structure; and
the free layer structure interfacing the spacer layer;
the base comprising at least said free layer structure;
the self pinned AP pinned layer structure including:
a ferromagnetic first antiparallel (AP) pinned layer;
a ferromagnetic second antiparallel (AP) pinned layer; and
a nonmagnetic antiparallel coupling (APC) layer located between the first and
second AP pinned layers;
the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;
the second AP pinned layer including:
an iron (Fe) film;
a cobalt iron (CoFe) film with a positive magnetostriction;
the iron (Fe) film being located between and interfacing the APC layer and the
cobalt iron (CoFe) film; and
the CoFe film having a magnetostrictive anisotropy field that is oriented
perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
layer structure.

1 18. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein
2 the cobalt iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 19. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein
2 the cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 20. (Original) A magnetic head assembly as claimed in claim 19 wherein the first
2 and second AP pinned layers have the same magnetic thickness.

1 21. (Withdrawn) A magnetic head assembly as claimed in claim 16 further
2 comprising:
3 the second AP pinned layer being composed of iron (Fe);
4 the first AP pinned layer including:
5 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer
6 layer;
7 said cobalt iron (CoFe) film; and
8 the cobalt iron (CoFe) film being located between and interfacing the first and
9 second iron (Fe) film.

1 22. (Withdrawn) A magnetic head assembly as claimed in claim 21 wherein the
2 cobalt iron film is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 23. (Withdrawn) A magnetic head assembly as claimed in claim 22 wherein the cobalt
2 iron film is $\text{Co}_{50}\text{Fe}_{50}$.

1 24. (Withdrawn) A magnetic head assembly as claimed in claim 23 wherein the first
2 and second AP pinned layers have the same magnetic thickness.

25. (Cancelled)

26. (Previously Presented) A magnetic disk drive comprising:
at least one magnetic head assembly that has a head surface;
the magnetic head assembly having a write head and a read head;
the read head including:
ferromagnetic first and second shield layers; and
a spin valve transistor located between the first and second shield layers;
the spin valve transistor comprising:
an emitter;
a collector;
a base between the emitter and the collector;
a spin valve including:
a ferromagnetic free layer structure;
a self-pinned antiparallel (AP) pinned layer structure without any pinning structure
pinning the self-pinned AP pinned layer structure;
a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
structure; and
the base comprising at least said free layer structure;
the self pinned AP pinned layer structure comprising:
a ferromagnetic first antiparallel (AP) pinned layer;
a ferromagnetic second antiparallel (AP) pinned layer;
a nonmagnetic antiparallel coupling (APC) layer located between the first and
second AP pinned layers;
one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
a positive magnetostriction;
the CoFe film having a magnetostrictive anisotropy field that is oriented
perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
layer structure; and
the first and second AP pinned layers having the same magnetic thickness;
a housing;
a magnetic medium supported in the housing;

31 a support mounted in the housing for supporting the magnetic head assembly with said head
32 surface facing the magnetic medium so that the magnetic head assembly is in a transducing
33 relationship with the magnetic medium;
34 a motor for moving the magnetic medium; and
35 a processor connected to the magnetic head assembly and to the motor for exchanging
36 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 27. (Previously Presented) A magnetic disk drive comprising:

2 at least one magnetic head assembly that has a head surface;

3 the magnetic head assembly having a write head and a read head;

4 the read head including:

5 ferromagnetic first and second shield layers; and

6 a spin valve transistor located between the first and second shield layers;

7 the spin valve transistor comprising:

8 an emitter;

9 a collector;

10 a base between the emitter and the collector;

11 a spin valve including:

12 a ferromagnetic free layer structure composed of iron (Fe);

13 a self-pinned antiparallel (AP) pinned layer structure;

14 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
15 structure; and

16 the free layer structure interfacing the spacer layer;

17 the base comprising at least said free layer structure;

18 the self pinned AP pinned layer structure including:

19 a ferromagnetic first antiparallel (AP) pinned layer;

20 a ferromagnetic second antiparallel (AP) pinned layer; and

21 a nonmagnetic antiparallel coupling (APC) layer located between the first and
22 second AP pinned layers;

23 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

24 the second AP pinned layer including:

25 an iron (Fe) film with a positive magnetostriction;

26 a cobalt iron (CoFe) film;
27 the iron (Fe) film being located between and interfacing the APC layer and the
28 cobalt iron (CoFe) film; and
29 the CoFe film having a magnetostrictive anisotropy field that is oriented
30 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
31 layer structure;
32 a housing;
33 a magnetic medium supported in the housing;
34 a support mounted in the housing for supporting the magnetic head assembly with said head
35 surface facing the magnetic medium so that the magnetic head assembly is in a transducing
36 relationship with the magnetic medium;
37 a motor for moving the magnetic medium; and
38 a processor connected to the magnetic head assembly and to the motor for exchanging
39 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 28. (Original) A magnetic disk drive as claimed in claim 27 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 29. (Previously Presented) A magnetic disk drive as claimed in claim 27 wherein the
2 cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 30. (Original) A magnetic disk drive as claimed in claim 29 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 31. (Withdrawn) A magnetic disk drive as claimed in claim 26 further comprising:
2 the second AP pinned layer being composed of iron (Fe);
3 the first AP pinned layer including:
4 first and second iron (Fe) films with the first iron (Fe) layer film interfacing the
5 spacer layer;
6 said cobalt iron (CoFe) film; and
7 the cobalt iron (CoFe) film being located between and interfacing the first and
8 second iron (Fe) film.

1 32. (Withdrawn) A magnetic disk drive as claimed in claim 31 wherein the cobalt
2 iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 33. (Withdrawn) A magnetic disk drive as claimed in claim 32 wherein the cobalt
2 iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 34. (Withdrawn) A magnetic disk drive as claimed in claim 33 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 35. (Previously Presented) A spin valve transistor as claimed in claim 9 wherein the
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 36. (Previously Presented) A spin valve transistor as claimed in claim 35 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 37. (Previously Presented) A spin valve transistor as claimed in claim 36 wherein
2 the first and second AP pinned layers have the same magnetic thickness.

1 38. (Previously Presented) A magnetic head assembly as claimed in claim 19
2 wherein the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the
3 spacer layer.

1 39. (Previously Presented) A magnetic head assembly as claimed in claim 38 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 40. (Previously Presented) A magnetic head assembly as claimed in claim 39
2 wherein the first and second AP pinned layers have the same magnetic thickness.

1 41. (Previously Presented) A magnetic disk drive as claimed in claim 29 wherein the
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 42. (Previously Presented) A magnetic disk drive as claimed in claim 41 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 43. (Previously Presented) A magnetic disk drive as claimed in claim 42 wherein the
2 first and second AP pinned layers have the same magnetic thickness.

1 44. (Previously Presented) A spin valve transistor as claimed in claim 6 wherein at
2 least one of the AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 45. (Previously Presented) A spin valve transistor as claimed in claim 44 wherein
2 the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer
3 layer.

1 46. (Currently Amended) A spin valve transistor as claimed in claim 45 further
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi
4 levels of the layers in said base.

1 47. (Previously Presented) A magnetic head assembly as claimed in claim 16 wherein
2 at least one of the AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 48. (Previously Presented) A magnetic head assembly as claimed in claim 47 wherein
2 the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer
3 layer.

1 49. (Currently Amended) A magnetic head assembly as claimed in claim 48 further
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi
4 levels of the layers in said base.

1 50. (Previously Presented) A magnetic disk drive as claimed in claim 26 wherein at
2 least one of the AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 51. (Previously Presented) A magnetic disk drive as claimed in claim 50 wherein the
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 52. (Currently Amended) A magnetic disk drive as claimed in claim 51 further
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi
4 levels of the layers in said base.